

- c². Furrow-spinelets 6; actinal intermediate spinelets usually 3 (2 to 4); prominent abactinal plates numerous (more than 30 and as many as 50 to each fifth of body) and with not more than 15 spinelets to a plate, frequently 10 or less *Asterina coronata cristata* (Fisher)*. (Caroline Islands.)

EXPLANATION OF PLATE XIII.

Type of *Asterina coronata cristata* (Fisher).VI.—*Is Dicrocoelium lanceatum a Parasite of the Cat?*
A Note on a new Variety. . By H. A. BAYLIS, B.A.

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[Plate XIV.]

REFERENCES have occasionally been made in helminthological literature † to the occurrence of "*Distomum lanceolatum*" ‡ in the cat. These cases have, however, in recent years been generally discredited, and it has been suspected that the parasites recorded belonged to one or other of the species of *Opisthorchis* or *Clonorchis* (*O. felineus* and *C. sinensis*) known to occur in cats, these forms being more or less similar to *Dicrocoelium lanceatum* in size and superficial appearance, though differing widely from it in their internal structure.

The typical *D. lanceatum* is a well-known parasite of sheep and cattle, and of various other herbivorous mammals; it is also an occasional, and probably accidental, parasite of man, having been met with some six times. Its occurrence in a carnivore, however, is a point with regard to which some scepticism is not unnatural. When, therefore, I received some time ago some Trematodes taken from the liver of a cat, I was greatly interested to find that they belonged undoubtedly to the genus *Dicrocoelium*, and differed from the typical *D. lanceatum* only in certain very small anatomical

* This form is probably distributed over western Oceania. It seems to be readily separable from the Japanese form, which has been classed as true *coronata*, although it probably is not.

† See, e. g., Leuckart, 'Die Parasiten des Menschen,' I., Abth. 2, p. 360; von Linstow, 'Compendium der Helminthologie,' p. 30.

‡ Synonymy: *Fasciola lanceolata* Rudolphi, 1803; *Distomum lanceolatum* Mehlis, 1825; *Dicrocoelium lanceolatum* Dujardin, 1845; *Dicrocoelium lanceatum* Stiles & Hassall, 1897.

details. These specimens, of which there is a considerable number, were collected at Georgetown, British Guiana, by Mr. G. E. Bodkin, Government Biologist, during November, 1915. They were kindly handed to me for determination by the Imperial Bureau of Entomology.

On a consideration of the many resemblances between these examples and the typical *D. lanceatum*, and of the minor points in which they differ from it, I am inclined to regard them as belonging to a well-marked variety of that species, rather than a distinct form. The one salient feature is the position of the testes, which in the specimens under consideration invariably lie symmetrically opposite to each other in the same transverse plane. All authorities are agreed in describing the testes of *D. lanceatum* as being placed nearly "tandem," *i. e.*, one behind the other, but somewhat diagonally, near the longitudinal axis of the body*. The exact position of the testes is, as a rule, a very constant specific character in Trematodes; but in this case the almost complete correspondence between the rest of the anatomy and that of the typical form seems to outweigh such a consideration. The only other differences that I have been able to find are in the somewhat smaller size of the cirrus-sac and the slightly larger average size of the eggs. Even the coils of the uterus show complete agreement, as far as they can be traced. For the sake of comparison, however, with the type, it may be worth while to give a fairly full description of the new variety.

The length of the worms varies between 5 and 7 mm., and the maximum widths for these lengths respectively are 1.62 mm. and 2 mm. The body is flattened dorso-ventrally, narrowing considerably from side to side in front, and less so behind. The posterior end is frequently somewhat rounded; sometimes, however, it is more pointed than in the example figured. To the naked eye the body is whitish and semi-transparent (in spirit), the masses of fully-formed eggs in the uterus being visible as blackish or brownish patches. The skin is smooth.

The oral sucker is subterminal, and has a diameter of

* Neveu-Lemaire ('Précis de Parasitologie humaine') gives a figure of *D. lanceatum* (reproduced in Brumpt's 'Précis de Parasitologie,' 2nd ed. 1913, p. 335), in which the testes are symmetrically arranged; but there is no reference to the source of the specimen from which the original figure was drawn, and no description of the internal anatomy is given in Neveu-Lemaire's work. The figure is, in other respects, very rough and inaccurate.

0·37 mm.*. The ventral sucker is situated 0·7 mm. behind it, and measures 0·4 mm. across. The mouth is followed immediately by a small, almost globular pharynx, measuring 0·15 mm. in length, and this is succeeded by an œsophagus 0·2 mm. long. The two simple intestinal diverticula extend backwards to within a little more than 1 mm. from the posterior end. They lie, for the greater part of their length, near the lateral margins of the body.

The excretory vesicle is small and inconspicuous. Its pore is terminal.

The genital pore is median, situated between the two suckers and at about the level of the bifurcation of the intestine. The testes are large compact bodies, slightly lobulated, especially on their lateral margins. They lie, as has been noted already, symmetrically opposite to each other, immediately behind and at the sides of the ventral sucker, and between the intestinal diverticula. Each testis measures about 0·8 mm. in length and 0·6 mm. in width. The ovary is a body of variable shape, but usually somewhat lobate; it is situated close behind the testes, but its position shows considerable variation. It appears to be rather more commonly situated on the right side than on the left, but in three out of eight stained examples the ovary was placed behind the left testis. There is a rather large rounded receptaculum seminis, situated just dorsally to the posterior edge of the ovary. Laurer's canal is present, and a shell-gland, not differing from that of the typical *D. lanceatum*. The cirrus-sac is about 0·4 mm. long and 0·15 mm. wide. It contains a coiled vesicula seminalis. The cirrus-sac participates in the variability of position shown by the ovary and its associated organs. Thus, when the ovary is on the right, the cirrus-sac lies to the right of the terminal portion of the uterus; when the ovary is on the left, the positions of the genital ducts are generally reversed.

The vitelline glands lie within the middle third of the body, and extend along the sides as a series of lobes of various sizes. The two vitelline ducts are given off somewhat in front of the middle of the glands, and cross the body to unite into a much wider single duct just behind the ovary.

The uterus fills almost the whole of the middle and posterior portions of the body, from the level of the anterior end of the vitelline glands to the tail. Its coils, for the most

* This and the following measurements are taken from an example 5 mm. long, and are therefore to be regarded as somewhat below the mean.

part, take the form of transverse folds and lateral loops. In the middle region these are confined to the space between the vitelline glands, but more posteriorly they sometimes extend laterally beyond the intestinal diverticula. The ascending limb of the uterus passes forward between, and ventrally to, the testès. The eggs are roundish-oval in shape, and when fully formed have a rather thick brown shell, usually showing an indentation on one side, so that in profile one side is convex, the other concave. The eggs measure $42.5-50 \mu \times 30-35 \mu$.

The variety described above I propose to call

Dicrocoelium lanceatum St. & Hass., var. *symmetricum*,

in allusion to the arrangement of the testes.

This variety being at present known only from specimens collected from a single host, a cat, it is doubtful whether it should be regarded as a "local" variety or as a form peculiar to cats. An examination of examples of *D. lanceatum* from sheep or other herbivorous animals in the same locality would be of great interest from this point of view, as well as a further investigation of the parasites of cats. In any case, it would appear that the older helminthologists may have been correct in reckoning the cat among the hosts of "*Distomum lanceolatum*."

EXPLANATION OF PLATE XIV.

Dicrocoelium lanceatum, var. *symmetricum*. Ventral view of a stained specimen. *C.S.*, cirrus-sac; *Int.*, intestinal diverticulum; *Ov.*, ovary; *R.*, receptaculum seminis; *T.*, left testis; *V.*, vitelline glands; *V.S.*, ventral sucker.

VII. — *The Eggs and Spawning-habits of the Pilot Fish* (Naukrates ductor). By J. D. F. GILCHRIST, M.A., D.Sc., Ph.D.

In the course of a general enquiry into the spawning-habits of Cape fishes, a mature female of the pilot fish was found. The eggs and larvæ of about thirty Cape fishes have been described in local publications, but, as the pilot and its peculiar habits are so well known, and have attracted attention in all parts of the world, a description of the mature eggs of this fish, hitherto unrecorded, may be worthy of a special note, and interest a wider circle of readers, more especially as the nature of the eggs seems to